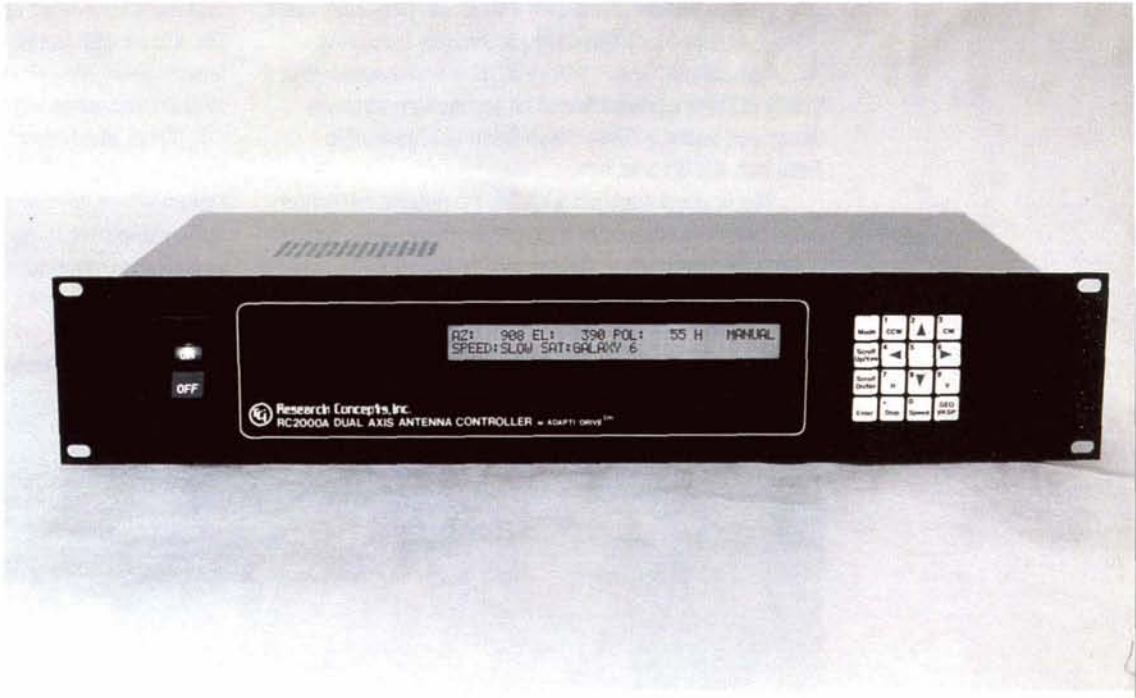
Antenna Controller

At right is an R2000B antenna controller developed by Research Concepts, Inc. (RCI), Lenexa, Kansas with an assist from a NASA software package. A device that controls a dish antenna for tracking a communications satellite, the R2000B represents a significant advance in satellite location and tracking because it provides an accurate, cost-effective way to track satellites in inclined orbits; satellites in such orbits have historically been difficult —and therefore expensive — to track.



Geosynchronous satellites, such as those in the networks of commercial communications satellites, orbit Earth at a rate equal to the rate at which Earth rotates about its axis. Natural forces tend to cause the satellite's orbital plane to tilt, or become *inclined* — meaning inclined to Earth's equatorial plane. To keep the satellite "stationary" and prevent drifting, an on-board rocket thruster system executes stationkeeping maneuvers — East/West maneuvers to keep the satellite in its assigned orbital position and North/South maneuvers to hold the satellite in Earth's equatorial plane.

However, when a satellite's thruster propellant supply dwindles, technicians seeking to extend the satellite's life as long as possible may deliberately allow it to drift into an inclined orbit as a fuel-saving measure. The orbital change is accomplished by suspending North/South maneuvers while continuing the East/West maneuvers. The fuel saving and satellite life extension are of significant order because North/South stationkeeping normally expends 90 percent of the total propellant usage.

A satellite allowed to drift into an inclined orbit exhibits certain known characteristics. In developing the R2000B unit, RCI exploited these characteristics and additionally studied the satellite tracking techniques of a NASA computer program known as ASAP (Artificial Satellite Analysis Program), a general orbit prediction program originally developed by Jet Propulsion Laboratory.

The technology of the RCI tracking device, says company software engineer Steven Mikinski, affords substantial savings in inclined orbit tracking. RCI's use of the ASAP software, he adds, enabled company savings in avoiding duplicatory research and shortened the time needed to bring the R2000B to the marketplace.

ASAP was supplied to RCI by the Computer Software Management and Information Center (COSMIC)®, NASA's mechanism for making available to industry, academic and government clients computer programs, originally developed by government agencies, that have secondary utility (see page 128).

®COSMIC is a registered trademark of the National Aeronautics and Space Administration.